Chemistry of Natural Compounds, Vol. 36, No. 2, 2000

ESTERS OF *Ferula kuhistanica*

A. U. Babekov,[2] A. I. Saidkhodzhaev,[1] and B. M. Keneshov [2]

UDC 547.992:547.37

In continuation of investigations of plant terpenes from the celery genus *Ferula* L. (Apiaceae), we studied essential oils of sesquiterpene alcohols from roots of *Ferula kuhistanica* Eug. Kor. that were collected near Khaidarkan of Fergan region in the Republic of Uzbekistan.

The roots were extracted with ethanol. The extracted substances were divided by treatment with aqueous solutions of Na_2CO_3 and NaOH into acidic, phenolic, and neutral fractions. Separation of the phenolic fraction on a silica-gel column with elution by $CHCl_3$ gave six substances of ester-like nature: $C_{23}H_{32}O_5$ (**1**), mp 130-131°C; $C_{23}H_{32}O_5$ (**2**), mp 78-80°C; $C_{22}H_{30}O_4$ (**3**), mp 120-121°C; $C_{23}H_{32}O_6$ (**4**), mp 176-178°C; $C_{23}H_{32}O_6$ (**5**), mp 102-103°C; $C_{22}H_{30}O_5$ (**6**), mp 164-165°C.

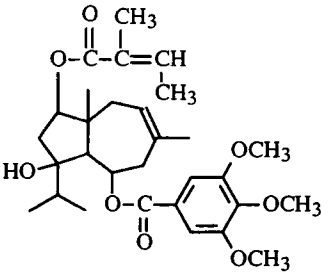
Compounds **1-6** were identified by comparing their physicochemical properties, IR spectra, and mixed-melting points as ferutin, teferin, ferutinine, tenuferin, tenuferinin, and tenuferidin, respectively [1-4].

Separation of the neutral fraction of extracted substances on a KCK silica-gel column with elution by hexane—ethylacetate (19:1, increasing content of the latter) isolated another two substances: $C_{25}H_{36}O_7$ (**7**), mp 124-125°C; $C_{30}H_{42}O_8$ (**8**), mp 100-101°C. The physicochemical properties and IR and PMR spectra identify **7** as ugaferin, which was previously isolated from *Ferula agamica* [5]. Compound **8** was new. We named it kuhferin. The IR spectrum of **8** contains absorption bands at 3527 (hydroxyl), 1695 (ester carbonyl on an aromatic ring), 1589 and 1506 cm^{-1} (benzene ring).

The PMR spectrum of kuhferin exhibits the following signals: doublets at 0.83 and 1.01 ppm (3H each, J = 6.5 Hz, C_{11}–$2CH_3$), singlets at 1.2 (3H, C_1–CH_3) and 1.8 ppm (3H, C_8–CH_3), singlet at 1.92 ppm (3H, C_2'–CH_3), doublet at 2.0 ppm (3H, C_3'–CH_3), singlet at 3.85 ppm (9H, 3×OCH_3), doublet at 4.96 ppm (1H, J = 10 Hz, C_2–H), sextet at 5.02 ppm (1H, J_1 = J_2 = 10.5 Hz, J_3 = 2.5 Hz, C_6–H), triplet at 5.32 ppm (1H, J_1 = J_2 = 7.5 Hz, C_9–H), quartet at 6.08 ppm (1H, J_1 = 12.5 Hz, J_2 = 5 Hz, C_3'–H), singlet at 7.28 ppm (1H, C_2''–H, C_6''–H).

The mass spectrum of **8** contains peaks for ions with *m/z* 430 $(M - 100)^+$, 412 $(M - 100 - H_2O)^+$, 387 $(M - 100 - H_2O - CH_3)^+$, 212 $(C_{10}H_{12}O_5)^+$, 195, 177, 159, which are characteristic of terpenoid esters [6].

We propose the structure below as being most probable on the basis of these data:



REFERENCES

1. A. I. Saidkhodzhaev and G. K. Nikonov, *Khim. Prir. Soedin.*, 559 (1972).
2. T. Kh. Khasanov, A. I. Saidkhodzhaev, and G. K. Nikonov, *Khim. Prir. Soedin.*, 528 (1974).
3. A. I. Saidkhodzhaev and G. K. Nikonov, *Khim. Prir. Soedin.*, 28 (1973).
4. A. I. Saidkhodzhaev, *Khim. Prir. Soedin.*, 70 (1978).
5. A. I. Saidkhodzhaev and V. M. Malikov, *Khim. Prir. Soedin.*, 725 (1978).
6. A. I. Saidkhodzhaev, *Khim. Prir. Soedin.*, 537 (1996).

1) Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (99871) 120 64 75; 2) Institute of Medical Problems, South Division, National Academy of Sciences, Kirghiz Republic, Osh.
Translated from Khimiya Prirodnykh Soedinenii, No. 2, p. 174, March-April, 2000. Original article submitted May 1, 2000.

0009-3130/00/3602-0219$25.00